RADAR OBSERVATIONS OF 10

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Radar measurements of 10 can provide unique constraints on near-surface bulk density and roughness at cm-to-km scales. However, 10 is a much more difficult radar target than the icy Galilean satellites, because of its proximity to radio-bright Jupiter, its relatively rapid rotation and hence lower echo spectral density, and its lower intrinsic reflectivity. Radar observations of 10 were carried out with Arecibo's 13-cm system during each Jupiter opposition from 1975 to 1980 (Campbell et al., 1977, *Science* 196, 650; Campbell et al., 1978, *Icarus* 34, 254; Ostro et al., unpublished), but only half of the 16 observations yielded responses at a level (3 to 5 times the rms receiver noise) interpretable as a marginal detection. Strong detections were obtained with improved Arecibo instrumentation on 11 dates during 1987-1990 (Ostro et al., 1990, ***BAAS 22,*** 1109). That round of observations established Io's average radar properties and revealed significant heterogeneity in radar albedo (about three times the lunar value) and circular polarization ratio (about ten times the lunar value). Goldstone 3.5-cm observations (Ostro et al., unpublished) were carried out in 1991 and 1992, ending one week before this abstract was written; quick looks at the data suggest that echoes were detected at roughly the levels expected if the properties are like those at 13 cm. I'll review all the observations in my talk. The best prospects for useful radar investigations are with the upgraded Arecibo telescope in late 1998, after Jupiter returns to sufficiently northern declinations. Then the SNR will be adequate to use echo spectra to form north-south-ambiguous maps of the satellite's global reflectivity distribution with a fidelity comparable to that achieved for Ganymede (Ostro et al., 1992, ***J. Geophys. Res. 97,*** 18227) and to seek correlations with features seen in spacecraft images.